We Claim:

1. In a Computer Aided Design (CAD) Environment, a method for automatic mesh generation comprising the steps of:

composing a schematic MEMS(Micro Electro-Mechanical Systems) design suitable for system-level simulations, said MEMS design including a plurality of components, each said component of said plurality of components being associated with a mesh generator, each said mesh generator being computer instructions describing how to create a mesh for the associated component;

providing a mesh generation tool, said mesh generation tool using said plurality of mesh generators to generate at least one mesh that represents at least one of a MEMS device that is the subject of said schematic MEMS design and a user-defined sub-assembly; and

using said mesh automatically generated from said schematic MEMS design as input for a numerical PDE (Partial Differential Equation) solver in a simulation environment, said PDE solver verifying approximations made in said system-level simulations of said MEMS design.

2. The method of claim 1 wherein each said component is one of a behavioral model and at least one connection to other components.

3. The method of claim 1 wherein said system-level simulation environment is one of a circuit simulation environment and a signal flow simulation environment.

4. The method of claim 1, wherein the step of generating at least one mesh includes the further steps of:

generating a plurality of individual meshes for said plurality of components in said schematic MEMS design;

analyzing said schematic MEMS design to determine connections between a plurality of components in said schematic MEMS design; and

connecting said plurality of individual meshes into a single mesh based on said determined connections.

5. The method of claim 4, comprising the further step of:

adjusting programmatically a mesh density of each of said individual meshes based upon a programmatic analysis of said schematic MEMS design.

6. The method claim 4, comprising the further step of:

adjusting a mesh density of each of said individual meshes based upon an analysis of said schematic MEMS design.

7. The method of claim 4, comprising the further step of:

selecting an element type for an individual mesh based upon a programmatic analysis of said schematic MEMS design.

8. The method of claim 4, comprising the further step of:

selecting an element type for an individual mesh based upon an analysis of said schematic MEMS design.

9. The method of claim 1 wherein said PDE solver also receives at least one of boundary conditions and initial conditions as constraints based on programmatic analysis of said schematic design.

10. The method of claim 1, comprising the further step of:

providing a component library in said CAD environment, said component library holding a behavioral model for each component of said schematic MEMS design, said behavioral model being a mathematical description of said component.

11. The method of claim 1 wherein said PDE solver is used to obtain 3D simulation results for at least one of mechanical, electrostatic, magnetic, thermal, electrothermal, piezoelectric, piezo-resistive, fluid damping and electromagnetic effects.

12. The method of claim 1 wherein said generated mesh is at least one of a finite element method (FEM) mesh, boundary element method (BEM) mesh and hybrid FEM/BEM mesh.

13. In a design environment, a method for automatic mesh generation comprising the steps of:

composing a schematic design suitable for system-level simulations, said design including a plurality of components, each said component of said plurality of components being associated with a mesh generator, each said mesh generator being computer instructions describing how to create a mesh for the associated component;

providing a mesh generation tool, said mesh generation tool using said plurality of mesh generators to generate at least one mesh that represents at least one of a device that is the subject of said schematic design and a user-defined sub-assembly; and

using said mesh automatically generated from said schematic design as input for a numerical solver in a simulation environment, said solver verifying approximations made in said system-level simulations of said schematic design.

14. The method of claim 13 wherein each said component is one of a behavioral model and one or more connections to other components.

15. The method of claim 13 wherein said system-level simulation environment is one of a circuit simulation environment and a signal flow simulation environment.

16. The method of claim 13, wherein the step of generating said mesh includes the further steps of:

generating a plurality of individual meshes for said plurality of components in said schematic design;

analyzing said schematic design to determine connections between a plurality of components in said schematic design; and

connecting said plurality of individual meshes into a single mesh based on said determined connections.

17. The method of claim 16, comprising the further step of:

adjusting programmatically the mesh density of each of said individual meshes based upon a programmatic analysis of said schematic design.

18. The method of claim 16, comprising the further step of:

adjusting the mesh density of each of said individual meshes based upon an analysis of said schematic design.

19. The method of claim 16, comprising the further step of:

selecting an element type for an individual mesh based upon a programmatic analysis of said schematic design.

20. The method of claim 16, comprising the further step of:

selecting an element type for an individual mesh based upon an analysis of said schematic design.

21. The method of claim 13, comprising the further step of:

providing a component library in said design environment, said component library holding a behavioral model for each component of said schematic design, said behavioral model being a mathematical description of said component.

22. The method of claim 13 wherein said numerical solver also receives at least one of boundary conditions and initial conditions as constraints based on programmatic analysis of said schematic design.

23. The method of claim 13 wherein said generated mesh is at least one of a finite element method (FEM) mesh, boundary element method (BEM) mesh and hybrid mesh.

24. In a Computer Aided Design (CAD) Environment, a method for automatic mesh generation comprising the steps of:

providing a schematic MEMS(Micro Electro-Mechanical Systems) design suitable for system-level simulation, said MEMS design including a plurality of components, each said component of said plurality of components being associated with a mesh generator, each said mesh generator being computer instructions describing how to create at least one of a finite element method (FEM) mesh, boundary element method (BEM) mesh and hybrid mesh for the associated element;

providing a mesh generation tool, said mesh generation tool using said plurality of mesh generators to generate at least one of a FEM mesh, BEM mesh and hybrid mesh that represents at least one of a MEMS device that is the subject of said schematic MEMS design and a user-defined sub-assembly; and

using at least one of said FEM mesh, said BEM mesh and said hybrid mesh automatically generated from said schematic MEMS design as input for a numerical PDE (Partial Differential Equation) solver in a simulation environment, said PDE solver verifying approximations made in said system-level simulations of said MEMS design.

25. The method of claim 24, wherein the step of generating at least one of said FEM mesh, said BEM mesh and said hybrid mesh includes the further steps of:

generating a plurality of individual meshes for said plurality of components in said schematic MEMS design;

analyzing said schematic MEMS design to determine connections between a plurality of components in said schematic MEMS design; and

connecting said plurality of individual meshes into a single mesh based on said determined connections.

26. The method of claim 25, comprising the further step of:

adjusting programmatically the mesh density of each of said individual meshes based upon a programmatic analysis of said schematic MEMS design.

27. The method of claim 25, comprising the further step of:

selecting an element type for an individual mesh based upon a programmatic analysis of said schematic MEMS design.

28. In a Computer Aided Design (CAD) Environment, a medium holding computer-executable steps for a method, said method comprising the steps of:

composing a schematic MEMS(Micro Electro-Mechanical Systems) design suitable for system-level simulations, said MEMS design including a plurality of components, each said component of said plurality of components being associated with a mesh generator, each said mesh generator being computer instructions describing how to create a mesh for the associated component;

providing a mesh generation tool, said mesh generation tool using said plurality of mesh generators to generate at least one mesh that represents at least one of a MEMS device that is the subject of said schematic MEMS design and a user-defined sub-assembly; and

using said mesh automatically generated from said schematic MEMS design as input for a numerical PDE (Partial Differential Equation) solver in a simulation environment, said PDE solver verifying approximations made in said system-level simulations of said MEMS design.

29. The medium of claim 28 wherein each said component is one of a behavioral model and at least one connection to other components.

30. The medium of claim 28 wherein said system-level simulation environment is one of a circuit simulation environment and a signal flow simulation environment..

31. The medium of claim 28 wherein the step of generating at least one mesh includes the further steps of:

generating a plurality of individual meshes for said plurality of components in said schematic MEMS design;

analyzing said schematic MEMS design to determine connections between a plurality of components in said schematic MEMS design; and

connecting said plurality of individual meshes into a single mesh based on said determined connections.

32. The medium of claim 31 wherein said method comprises the further step of:

adjusting programmatically a mesh density of each of said individual meshes based upon a programmatic analysis of said schematic MEMS design.

33. The medium of claim 31 wherein said method comprises the further step of:

adjusting the mesh density of each of said individual meshes based upon an analysis of said schematic MEMS design.

34. The medium of claim 31 wherein said method comprises the further step of:

selecting an element type for an individual mesh based upon a programmatic analysis of said schematic MEMS design.

35. The medium of claim 31 wherein said method comprises the further step of:

selecting an element type for an individual mesh based upon an analysis of said schematic MEMS design.

36. The medium of claim 28 wherein said numerical solver also receives at least one of boundary conditions and initial conditions as constraints based on programmatic analysis of said schematic design.

37. The medium of claim 28 wherein said method comprises the further step of:

providing a component library in said CAD environment, said component library holding a behavioral model for each component of said schematic MEMS design, said behavioral model being a mathematical description of said component.

38. The medium of claim 28 wherein said PDE solver is used to obtain 3D simulation results for at least one of mechanical, electrostatic, magnetic, thermal, electrothermal, piezoelectric, piezo-resistive, fluid damping and electromagnetic effects.

39. The medium of claim 28 wherein said method comprises the further step of:

using said schematic MEMS design as the basis for a 3D model displayed to a user of said CAD environment.

40. The medium of claim 28 wherein said generated mesh is at least one of a finite element method (FEM) mesh, boundary element method (BEM) mesh and hybrid mesh.

41. In a Computer Aided Design (CAD) Environment, a medium holding computer-executable steps for a method, said method comprising the steps of:

providing a schematic MEMS(Micro Electro-Mechanical Systems) design suitable for system-level simulation, said MEMS design including a plurality of components, each said component of said plurality of components being associated with a mesh generator, each said mesh generator being computer instructions describing how to create at least one of a finite element method (FEM) mesh, boundary element method (BEM) mesh and hybrid mesh for the associated element;

providing a mesh generation tool, said mesh generation tool using said plurality of mesh generators to generate at least one of a FEM mesh, BEM mesh and hybrid mesh that represents at least one of a MEMS device that is the subject of said schematic MEMS design and a user-defined sub-assembly; and

using said at least one of said FEM mesh, said BEM mesh and said hybrid mesh automatically generated from said schematic MEMS design as input for a numerical PDE (Partial Differential Equation) solver in a simulation environment, said PDE solver verifying approximations made in said system-level simulations of said MEMS design.

42. In a design environment, a medium holding computer-executables steps for a method, said method comprising the steps of:

composing a schematic design suitable for system-level simulations, said design including a plurality of components, each said component of said plurality of components being associated with a mesh generator, each said mesh generator being computer instructions describing how to create a mesh for the associated component;

providing a mesh generation tool, said mesh generation tool using said plurality of mesh generators to generate at least one mesh that represents at least one of a device that is the subject of said schematic design and a user-defined sub-assembly; and

using said mesh automatically generated from said schematic design as input for a numerical solver in a simulation environment, said solver verifying approximations made in said system-level simulations of said schematic design.

43. The medium of claim 42 wherein each said component is one of a behavioral model and one or more connections to other components.

44. The medium of claim 42 wherein said system-level simulation environment is one of a circuit simulation environment and a signal flow simulation environment.

45. The medium of claim 42 wherein the step of generating said mesh includes the further steps of:

generating a plurality of individual meshes for said plurality of components in said schematic design;

analyzing said schematic design to determine connections between a plurality of components in said schematic design; and

connecting said plurality of individual meshes into a single mesh based on said determined connections.

46. The medium of claim 45 wherein said method comprises the further step of:

adjusting programmatically the mesh density of each of said individual meshes based upon a programmatic analysis of said schematic design.

47. The medium of claim 45 wherein said method comprises the further step of:

adjusting the mesh density of each of said individual meshes based upon an analysis of said schematic design.

48. The medium of claim 45 wherein said method comprises the further step of:

selecting an element type for an individual mesh based upon a programmatic analysis of said schematic design

49. The medium of claim 45 wherein said method comprises the further step of:

selecting an element type for an individual mesh based upon an analysis of said schematic design.

50. The medium of claim 42 wherein said method comprises the further step of:

providing a component library in said design environment, said component library holding a behavioral model for each component of said schematic design, said behavioral model being a mathematical description of said component.

51. The medium of claim 42 wherein said numerical solver also receives at least one of boundary conditions and initial conditions as constraints based on programmatic analysis of said schematic design.

52. The medium of claim 42 wherein said generated mesh is at least one of a finite element method (FEM) mesh, boundary element method (BEM) mesh and hybrid mesh.

53. In a CAD environment, a system comprising:

a schematic MEMS design suitable for system-level simulations, said schematic MEMS design including a plurality of components, each said component being associated with a mesh generator, said mesh generator being a set of computer instructions describing how to create a mesh for the associated component;

a mesh generation tool, said mesh generation tool using said plurality of mesh generators to generate at least one mesh that represents at least one of a MEMS device that is the subject of said schematic MEMS design and a user-defined sub-assembly; and

a numerical PDE solver, said numerical PDE solver using said generated mesh as input to verify approximations made in system-level simulations of the schematic MEMS design.

54. The system of claim 53 wherein said generated mesh is at least one of a finite element method (FEM) mesh, boundary element method (BEM) mesh and hybrid mesh.

55. The system of claim 53 wherein each said component is one of a behavioral model and at least one connection to other components.

56. The system of claim 53 wherein said system-level simulation is one of a circuit simulation and a signal flow simulation.

57. The system of claim 53 wherein a plurality of individual meshes is generated for said plurality of components in said schematic MEMS design.

58. The system of claim 57 wherein said schematic MEMS design is analyzed to determine connections between said plurality of components in said schematic MEMS design.

59. The system of claim 58 wherein said plurality of individual meshes are connected into a single mesh based on said determined connections.